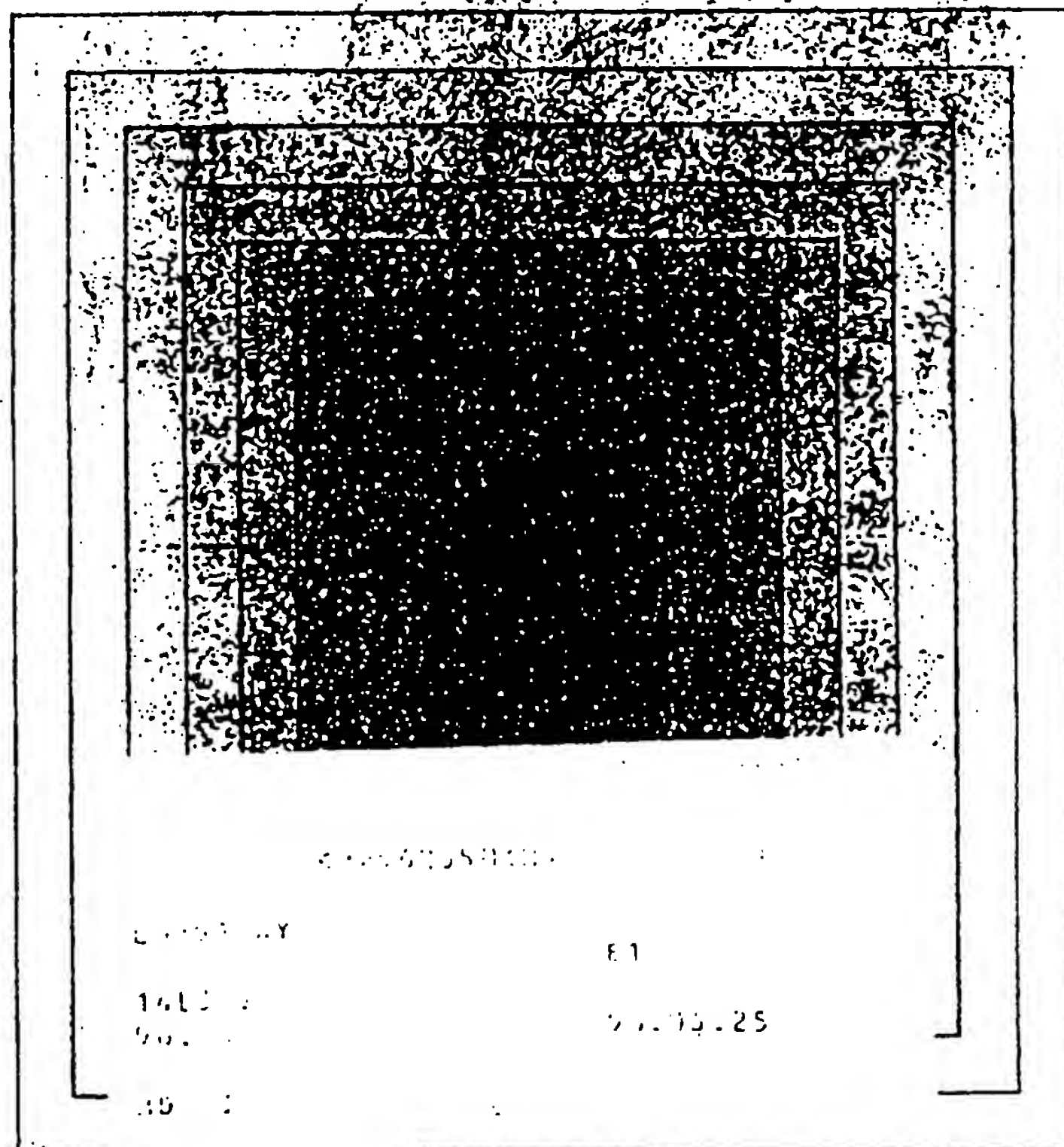


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開発者 南 部 文 生

提案番号 46A963332

樹脂封止型半導体リードフレーム

従来技術

リードフレームのベッド部をヒートシンクとして用いる従来のベッド露出型半導体製造装置は、基板への実装時においてヒートシンクが剥離する。これは、ヒートシンクが吊りピンのみで支えられ、エポキシ樹脂とヒートシンクの間に接着層がないためである。

目 的

本技術は、ヒートシンク（ベッド）の剥離を防ぎ、半導体装置の破壊を防止することを目的とする。

構 成

本技術は第2図に示すように、ヒートシンク3の剥離を防止させるため、ベッド下面のコーナ部にエッチングを施し、樹脂4を回り込ませる部分を設ける。樹脂4を回り込ませることによって剥離を防止する。QFPタイプの半導体製造装置で第2図に実例を示し、第3図に断面を示す。エッチングを施す厚さTはリードフレームの厚さをtとすると次式で表される。

$$1/3 t \leq T \leq 1/2 t$$

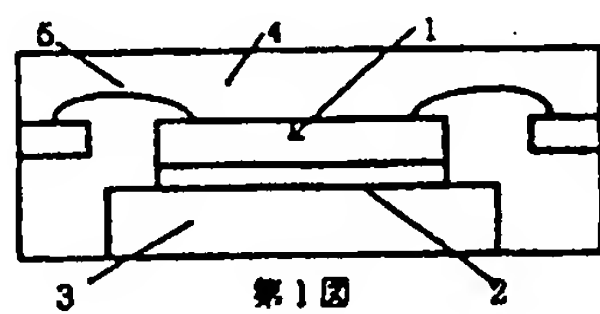
効 果

従来技術においては、半導体デバイスとリードフレームとの界面にて実装時において剥離が生じることがわかっている。これは、半導体を構成する材料間の線膨張係数の違いによるものと、樹脂とリードフレームの界面に存在する水分が高温の実装時に界面が膨張するためである。しかし、本技術によれば、剥離を防止するとともに半導体の信頼性を向上させることができる。

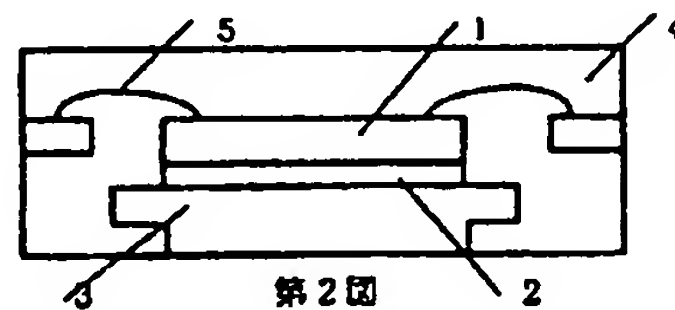
図面の簡単な説明

第1図は従来例を示す断面図、第2図は本技術の実施例を示す断面図、第3図は同じく外観を示す図、第4図は同じく第3図のA-A'面を示す図、第5図は同じくヒートシンク（透視図）を示す図である。

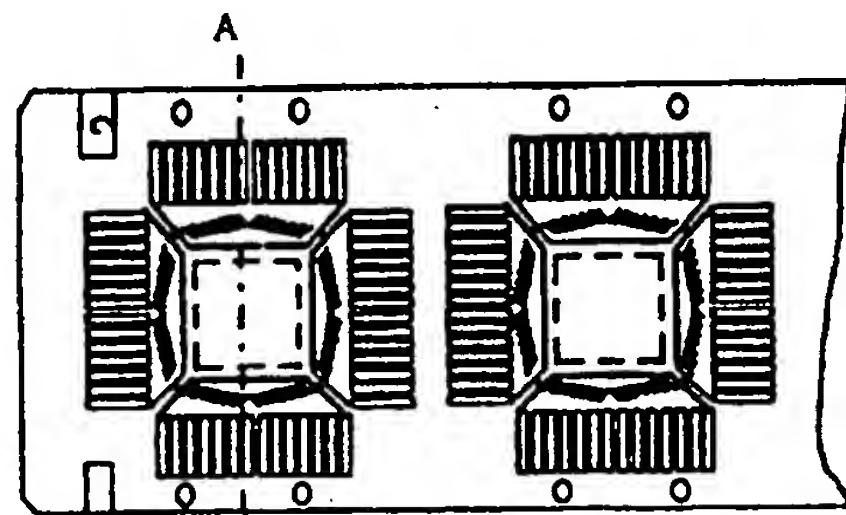
1……半導体デバイス、2……接着層、3……ヒートシンク、4……樹脂、5……ボンディングワイヤ。



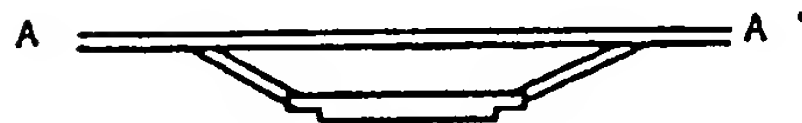
第1図



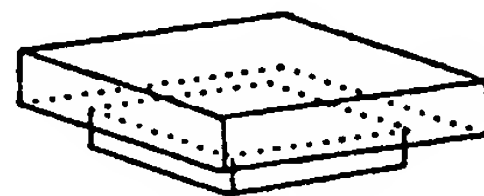
第2図



第3図



第4図



第5図

[Invention pertaining to a resin-sealed semiconductor lead frame]

Job No.: 2098-97535

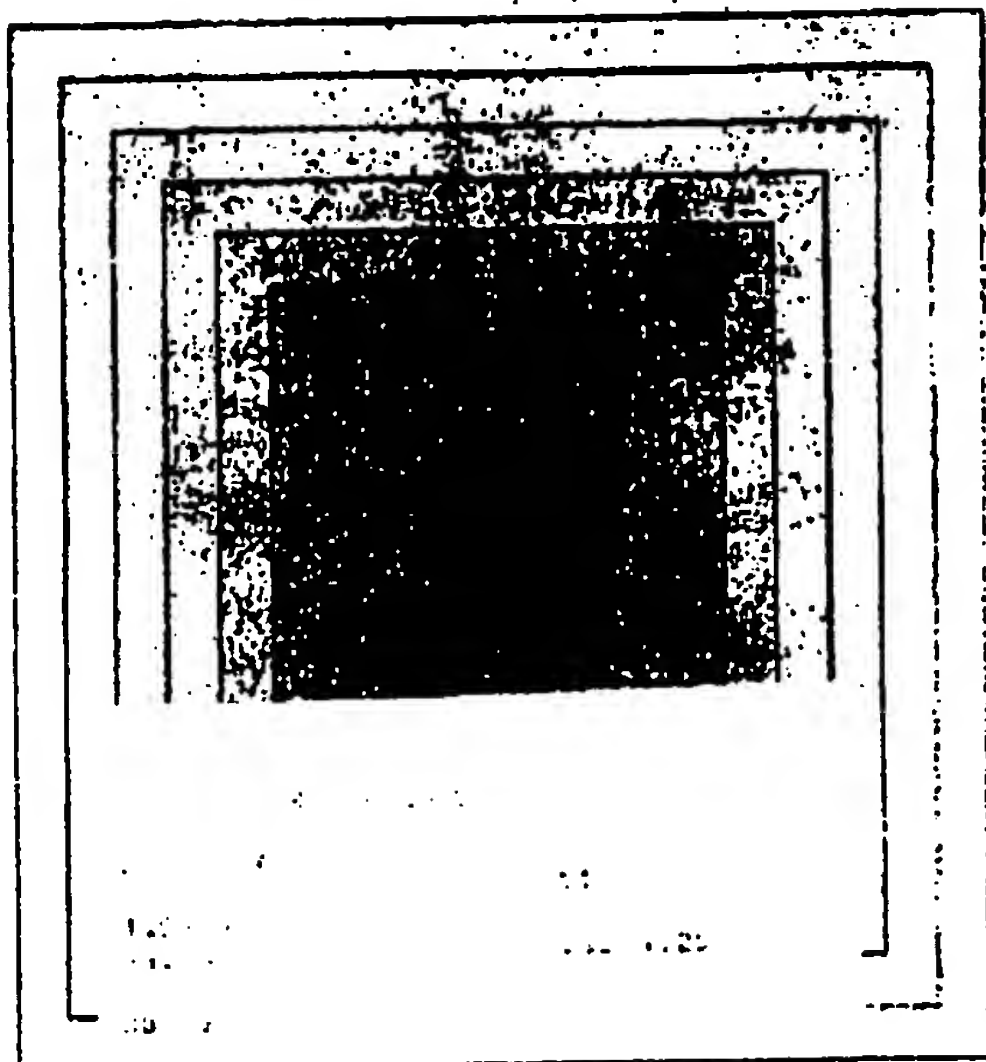
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Sequence No.: 96124146 Inventor: Fumio Nanbu

Proposal No.: 46A963332

Resin-sealed semiconductor lead frame

Prior art

In the case of an exposed semiconductor manufacturing device of the prior art in which the head part of a lead frame is used as a heat sink, the heat sink peels off during its mounting onto a substrate. This is because the heat sink is supported by hanging pins only, and no adhesive layer is provided between an epoxy resin and the heat sink.

Objective

The objective of the present technology is to prevent the heat sink (head) from peeling off in order to prevent destruction of the semiconductor device.

Configuration

As shown in Figure 2, in the present technology, etching is applied to the corner parts on the bottom surface of the head so as to create parts at which resin 4 can be rolled around in order to prevent heat sink 3 from peeling off. Peeling is prevented by rolling resin 4 around [the corner parts]. An actual example is shown using a QFP type semiconductor manufacturing device in Figure 2, and its cross sectional view is shown in Figure 3. When the thickness of the lead frame is denoted as t , etching thickness T can be expressed by the following equation.

$$1/3t \leq T \leq 1/2t$$

Effect

It has been known that peeling occurs at the interface between the semiconductor device and the lead frame during packaging in the case of the prior art. This is caused by a difference in the linear expansion factors of the materials used to configure the semiconductor and expansion of moisture present at the interface between the resin and the lead frame during high-temperature packaging. However, with the present technology, not only can peeling be prevented, but the reliability of the semiconductor can also be improved.

Brief description of the figures

Figure 1 is a cross-sectional view of a conventional example; Figure 2 is a cross-sectional view of the present technology; Figure 3 is an outer appearance thereof; Figure 4 shows the plane along line A-A' in Figure 3; and Figure 5 is a diagram of the heat sink (perspective view).

1 ... semiconductor device; 2 ... adhesive layer; 3 ... heat sink; 4 ... resin; and 5 ... bonding wire.

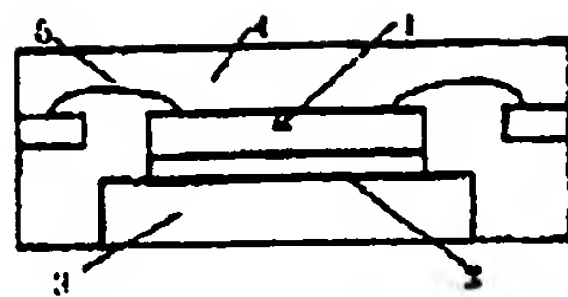


Figure 1

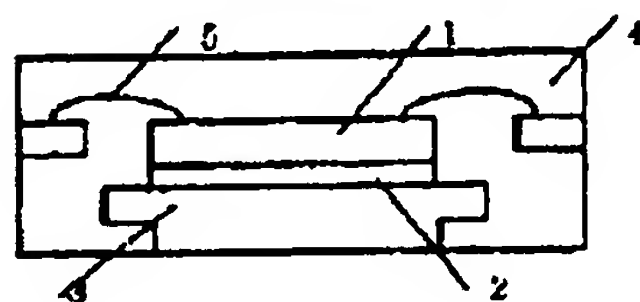


Figure 2

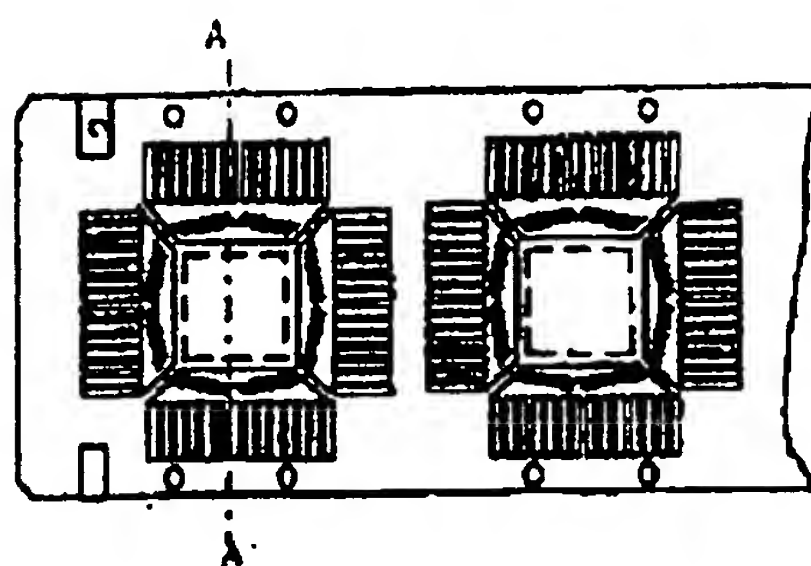


Figure 3

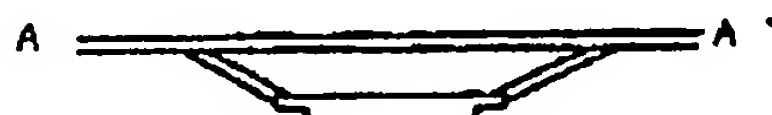


Figure 4

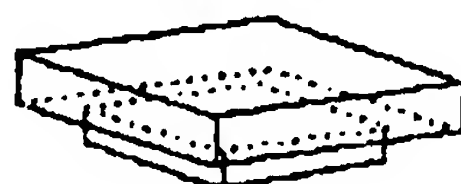


Figure 5



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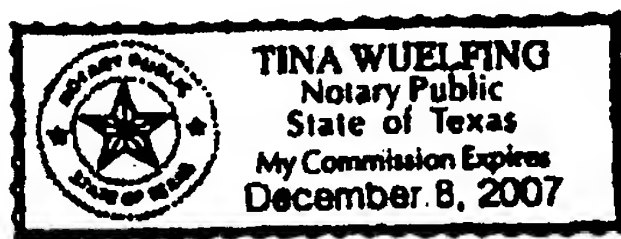
To Whom It May Concern:

This is to certify that a professional translator on our staff who is skilled in the Japanese language translated the enclosed Invention pertaining to a resin-sealed semiconductor lead frame from Japanese into English.

We certify that the attached English translation conforms essentially to the original Japanese language.

Kim Vitray
Operations Manager

Subscribed and sworn to before me this 25th day of March, 2004.



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